

THE MOON CONTROVERSY.

From the *Astronomical Register* for March 1864.

TO THE EDITOR OF THE ASTRONOMICAL REGISTER.

Sir,—One of the most extraordinary and amusing things about the moon controversy is, that the illustration which is relied upon by the opponents of the moon's *axial* rotation as best calculated to carry conviction to the minds of those who advocate it, is in fact one of the most convincing which can be adduced on the other side of the question. It was brought forward some years ago; and if it be really true that it and some others have never yet met with a reply, I can only attribute it to the fact, that their suicidal character was thought to render any serious refutation quite superfluous.

Let us look for a moment at the favourite line of soldiers about to "wheel" round the "pivot man;" and as the case is essentially the same with each man except the "pivot," we will, for the sake of simplicity, take the last man in the line—the farthest from the pivot. Now, let it be granted (and it cannot be denied) that if a man keeps his face directed towards the same point of the horizon, say the *north*, he does *not* rotate, or turn on his axis, whatever else he may do. Let this last man in the line keep his face towards the *north*, and start from the *east* side of the circle which he describes about the pivot, towards which his left shoulder is of course directed. When he has arrived at the north side of the circle, his face being still towards the north, his back will be turned to the pivot, and he will have to proceed crab-fashion, and left-shoulder first. When arrived at the west point of the circle, his right shoulder will be towards the pivot, and he will find himself constrained to walk backwards. So at the south point he will face the pivot as well as the north, and will be walking crab-wise again, with the right shoulder first; and so on round to the east point, from which he set out, where he will be walking forwards with his left shoulder towards the pivot. Thus he will have performed one revolution *without* turning on his axis; and consequently will have presented every side towards the centre. But if, on the contrary, he is throughout to present the *same* side to the centre (say the left shoulder with which he started), he will find it necessary to turn his face to every point of the compass during his passage round the centre; that is, he *must rotate once on his own axis in the same time, as is occupied by his walk round the circle.*

Rotation signifies turning like a wheel. Every particle of a rotating body is carried round the centre *in the same time.* If the moon were carried round the earth in 24 hours, we might reasonably conclude that she was attached to the earth by some rigid though invisible connection, and that her motion was really one of rotation and not of revolution. But as she occupies nearly a month instead of a day in her circuit, and there is nearly the same ratio between her periodic time and her mean distance from the earth as obtains in the other revolving bodies of the Solar System, we un-

hesitatingly conclude that her motion round the earth is one of *revolution*; and that as she always turns nearly the same face towards us, she must necessarily *rotate* on her axis in the same time as she revolves round her primary.

Sincerely apologising for offering you such elementary explanations, which, however, seem to be rendered necessary by strange misapprehensions on the simplest subjects,

I remain,

Yours faithfully,

W. R. DAWES.

Hopefield Observatory,
Haddenham, Bucks, Feb. 19, 1864.

Sir,—Unable to cope with “Cyclops” or “Oculi Ambo” in furnishing rhymes upon this subject, I venture to interpose a few reasons for taking a view somewhat different from that taken either by the gentleman “who had no eyes, and yet went out to view the skies,” or by the gentleman who “sees double,” and who therefore discovers that the moon both *revolves* and *rotates* simultaneously every month.

If “Cyclops” will keep in mind that the earth goes round the sun once a year, and the moon only *apparently* round the earth once a month—i. e. supposing him to be a Copernican philosopher, though such “an ancient!”—then he will see, even with one eye, that the moon’s *real* path is not a circle or ellipse round the earth, but only a wave-line or undulating path crossing and recrossing the earth’s orbit round the sun. All his arguments are based upon the notion that the moon really *revolves once round the earth in a circle* between one new moon and another. But the moon’s path in each lunation is a simple wave-line, very slightly differing from the curve of the thirteenth part of the earth’s orbit. And though the moon has not in that time described anything like a circle or ellipse, but a simple open arch—less curved, probably, than “Cyclops’” eyebrow when he now elevates it with astonishment—she has, nevertheless, turned fairly once round upon her axis, and so (*not*, as the Cambridge “Enquirer” supposes in your last number, because the earth is in a “fixed position”) she has looked all round the earth.

In fact, the moon’s real path is nearly a circle round the sun—not “a circle round the earth” at all. In describing this circular path once a year, she crosses and recrosses the earth’s path every month, sometimes moving faster, sometimes slower than the earth, and thus getting between the earth and sun, sometimes falling behind the earth in her first quarter, then overtaking it and getting before it, in “opposition,” and in her last quarter; and she *rotates thirteen times upon her axis during each complete revolution she makes*, and not once only, as “Oculi Ambo” and “Argus” blindly maintain. These illuminati, so potent in repetition of all we have heard since we were babies—both found their arguments and illustrations unwittingly upon the hypothesis that the earth (or centre round which they suppose the moon to move) is *at rest*; and they argue as if “Cyclops” denied both the rotation and the revolving of the moon, whereas he appears merely to maintain that revolution implies rotation, and that, as a top spins round, its centre is “rotating,” while any point in its circumference “revolves,” or simply “turns round,” at a distance from the centre.

As our theoretical astronomy is becoming more and more complicated, I must add that my description of the actual paths of the earth and moon is founded on the heliocentric hypothesis of Copernicus and Newton, *with the*

sun at rest, and would be no longer accurate if the sun were really "moving in space."

I am, Sir, your faithful Servant,
J. R.

Feb. 8, 1864.

Sir,—Thinking the description of an experiment, contrived a few nights since to explain to some friends the object of the lunar controversy, may interest your readers, I venture to append it. Into a wooden stand was fixed an upright piece of stout wire, having on its summit a brass ball to represent the earth; a second piece of similar wire was next wound at one end round the first, so as to turn freely upon it, and at the other end bent at right angles to form a second upright; a ball partially pierced to turn freely on it, surmounts the latter. This ball has a screw by which it can be clamped on to its axis, and also a grooved wheel of wood about two inches diameter fixed to it. A similar wheel was fixed immovably on to the centre pin. If now the movable ball be fixed by the screw, and a mark placed on the side next the central globe, when caused by the arm to revolve in its orbit, it will be found always to have this side next the centre, which is precisely the appearance presented by the moon. If now the outer be freed, and the wheels connected by an elastic belt, it will rotate once during each orbital revolution, which, according to astronomers, the moon does; but it will be seen that the face presented towards the centre of its orbit will constantly change as it revolves, which is not the case with the moon.

If the observer note the effects of the above from a point without the orbit, they will, of course, be reversed, but such a position would obviously in no-wise represent that of a terrestrial observer with regard to the moon. Were "Oculi Ambo" to fasten the string to the centre of the table as he should, Cyclops would not wind on himself by revolution about the table without rotation.

If, as "A. L. S." avers, the compass card does not rotate on its axis in his experiment, it cannot be affected by fixture on the latter; let him try the experiment so, and I think the result will hardly help the supporters of the theory of the moon's axial rotation.

I am, Sir, yours obediently,
S. B. K.

Streatham Hill, Feb. 16, 1864.

Sir,—The question seems to be one of *terms* rather than of *facts*, and may be disposed of, perhaps, by an accurate definition of *rotation*. The derivation of this word is obvious, and gives some clue to its signification. But still there seems a difficulty in giving such a definition of the term as will meet all cases.

If we fix an apple tight to the rim of a cart wheel by a nail driven through it parallel to the axle, and so that the rosy side may be towards the centre of the wheel, and fix another so as to turn easily round its nail, the rosy side of the latter being loaded; then as the cart proceeds, the tight-fixed apple will always present its rosy side to the centre of the wheel, but this side *will be turned to earth and sky, and opposite horizons, and all points between.* The other apple will always present its rosy side to the ground, and *will rotate on the surface of the wheel.*

Can both apples be said to *rotate*? and is not rotation a term of *relative motion*?

I am, Sir, yours, &c.,
ANOTHER ENQUIRER.

19th Feb. 1864.

Sir,—“*Oculi Ambo*” ought to make better use of his “plural eyes.” If he looked deeper into the matter, he would see that a person walking round the table with a string fastened to himself and to the fender, winds the string round himself by *turning round* the lamp in the centre of the table, not by turning round his own axis, as “*O. A.*” assumes. Let him attach the string to himself and to the lamp; then in walking round the table, with his face to the lamp, he will wind the string round the lamp, but not round himself. Next let him walk round the table, with his face to one side of the room, he will then wind the string round himself as well as round the lamp; showing that the motion is not single, but double. He will probably stare with both his eyes when he opens them to the fact that the motion he fancied double is a single movement: and the parallel motion, which he assumed to be single, is really compounded of two movements in contrary directions, which produce parallelism by mutually counteracting each other! If winding the string round himself is a criterion of *rotating* in the one case, as he assumes (erroneously); he cannot deny consistently that it is so in the case of parallel motion (which it really is).

“*A. L. S.*” misinterprets his own illustration:

“As any one may ascertain,
 Who tests it *thoroughly* again.”

If, “by virtue of the directive power of the magnetic needle, the card does not rotate,” what is the intent and purpose of delicately poising it on its pivot?

If walking across a circle has the same effect as walking half round it, what does “*Argus*” suppose becomes of the effect of circular motion—that of turning round? If I walk across a circle, following my nose along the diameter, I keep my face in the same direction all the time. But if I follow my nose along the semi-circumference, I change my direction gradually all the time, and look in the reverse direction when I arrive at the opposite side of the circle. If my nose is always foremost in the line of march, I do not turn on my axis, as I must do if I turn my nose always towards one point of the horizon.

Yours, &c.,
 CYCLOPS.

19th February, 1864.